IN THE SPECIFICATION:

Please amend the specification at page 1, line 9 as follows:

A UMTS communication system, defined in the UTMTS standard (see the "3GPP Technical Specifications, Rel. 99, ~~http://www.3gpp.org/specs/specs.htmi")~~ at the 3GPP website under specifications, incorporated herein by ~~regerence~~reference, comprises at least a base station (BS) and a mobile phone terminal, referred to as user equipment (UE) throughout the document. Both the BS and the UE includes a transmitter and a receiver. The BS sends signals by means of the BS transmitter to the UE receiver in the downlink. The UE sends signals by means of the UE transmitter to the BS receiver in the uplink. In uplink and downlink communication both the UE and BS map the data to be transmitted into logical channels.

Please amend the specification at page 3, line 1 as follows:

To this end, according to a first object of the invention, there is provided a method for estimating a propagation channel in the presence of transmit beamforming, ~~as claimed in claim 1.~~

~~In addition, according to a second object of the invention, there is provided~~ and an estimator for estimating a propagation channel in the presence of transmit beamforming as ~~claimed in claim 15.~~

~~In a first non-limitative embodiment of the invention, the method is characterized as claimed in claim 2.~~

~~In a second non-limitative embodiment of the invention, the method is characterized as claimed in claim 3.~~

~~In a first non-limitative embodiment of the invention, the estimator is characterized as~~

~~claimed in claim 16.~~

~~In a second non-limitative embodiment of the invention, the estimator is characterized as claimed in claim 17.~~

Please replace the paragraph beginning at page 7, line 5, as follows:

We consider a general case of transmission of a signal $s(t)$ through a multipath channel wit h impulse response $h(t,\tau)$. The continuous-time complex baseband received signal prior to A/D conversion at the receiver is modeled as:

$$y(t) = x(t) + v(t) \quad (1)$$

where $x(t)$ represents the part of the received signal that comprises the useful data and $v(t)$ denotes the noise plus interference term. The signal $x(t)$ is given by:

$$x(t) = \int h(t, t-\tau) z(\tau) \mathrm{d}\tau \quad (2)$$

where $h(t,\tau)$ represents a time-varying channel impulse response and

$$z(t) = \sum_k a(k)\psi(t - kT_c) \quad (3)$$

represents the transmitted signal after D/A conversion at the transmitter, with T_c denoting the chip period and $a(k) = s(\lfloor k/M \rfloor)d(k)$, where M denotes the spreading factor, and $\lfloor . \rfloor$ denotes the flooring operator. Moreover, $s(n)$ represents the n-th modulation symbol (e.g., QPSK), $d(k)$ denotes the k-th chip of the spreading sequence, and $\psi(t)$ represents the pulse-shaping filter that limits the system bandwidth. Note that this model can be used by systems with several spreading layers, like DS-CDMA system defined by the standard UMTS, IMT-2000 and IS-95 (see the "IMT-2000 website). ~~http://www.imt- 2000.org/portal/index.asp")~~ ~~incorporated herein by reference~~.

Please replace the paragraph beginning at page 26, line 24, as follows:

Some authors (see e.g.: "TSG RAN WG 4 meeting #17, R4-010594 Ericsson, *Dedicated Pilots*, May 2001," "TSG RAN WG 4 meeting #17, R4-010528 Nokia, *Proposal for user-specific beamforming for UTRA FDD*, May 2001"[[~~incorporated herein by reference~~, and references therein, available at ~~http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_17~~)]] have addressed the problem of DPDCH channel estimation in the presence of transmit beamforming. Mainly they conclude that since only the DPCH is affected by the transmit beamforming only the information available from the DPCH channel is to be used for DPDCH channel estimation under those circumstances. In particular when DD DPDCH ML channel estimates cannot be used due to complexity limitations, they recommend performing DPDCH channel estimation only exploiting the *a-priori* knowledge of the DPCCH pilot symbols. We shall notice that when it is viable both the algorithms described here by making use of information available from both the CPICH and the DPCCH have two major advantages with respect to a DPDCH channel estimation only based on the DPCCH pilots. First, the scarceness of pilot symbols provided by the DPCCH (from 1 to a maximum of 16 depending on the slot format see the hereby incorporated reference "3GPP Technical Specifications, Rel. 99, [[http://www.3gpp.org/specs/specs.html]]"), limits the accuracy of DPDCH channel estimate because of lack of sufficient noise and interference suppression. Secondly, as mentioned above, within a DPCH time-slot the DPCCH pilot symbols are not transmitted continuously as the CPICH pilot symbols, but they are time-multiplexed with the unknown data symbols comprising the DPDCH. In the presence of high Doppler spread, i.e. at high UE velocity, such structure of the DPCH time-slot might pose the problem of estimating the channel path coefficient $c_{dpdch}(k)$ during the absence of known pilot symbols as during the DPDCH period, unless the CPICH pilot symbols which are continuously transmitted are not exploited as well. Indeed if the Doppler spread is very low compared with the slot rate, the channel $c_{dpdch}(k)$ will vary so slowly within a slot period that it could be considered approximately constant over that period. Thus the channel estimate provided over the DPCCH can be considered valid for the whole DPDCH period. In other words there is no practical need of updating the DPDCH channel estimate at a higher rate than the slot rate. Conversely, if the Doppler spread is of the same order of magnitude as the slot rate or even larger, the

assumption that the DPDCH channel is approximately constant over a slot period is no longer valid. For instance, referring to the UMTS standard, a slot comprises 2560 chip periods yielding a slot rate of 1.5kHz whereas, under extreme cases, the system is supposed to cope with Doppler spread up to 1kHz. Therefore, in such cases the channel estimated over the DPCCH cannot be considered a valid approximation of the true channel $c_{dpdch}(k)$ for the entire successive DPDCH period. Under these circumstances one should resort to interpolation and prediction techniques or yet implement a DD mechanism similar to the one previously described that uses hard decision taken on the DPDCH data symbols as known pilots to update the channel estimates in order to update at the appropriate rate the channel estimate over the DPDCH period between two consecutive DPCCH bursts of known pilot symbols. A DPDCH channel estimator, including such a tracking mechanism for the channel estimates is likely to be too computationally demanding to be feasible. Furthermore, under certain practical circumstances, such as when the DPCCH logical channel consists of only a single pilot symbol per slot, that approach would definitely yield poor performance. The joint CPICH-DPCH MAP DPDCH channel estimation algorithm represents a solution to this problem since it implicitly performs prediction of the true DPDCH channel based on the whole available information adapting the prediction filter to the actual Doppler spread and number of DPCCH known pilot symbols. Similarly, also the second low complexity algorithm proposed here inherently exploits the presence of the known pilot symbols over both the DPCCH and CPICH logical channels and allows tracking of the DPDCH channel variations even at high Doppler spread. The latter algorithm results are more attractive from a practical implementation standpoint though due to the low complexity involved and the nearly optimal performance. Indeed the second DPDCH channel estimation algorithm, even in its least complexity instance, builds an estimate $\hat{\beta}$ of the beamforming complex factor β, jointly accounting for the DPCCH and CPICH available information (i.e. all available known pilot symbols), and provides up-to-date estimates of the DPDCH channel by multiplying the estimated factor $\hat{\beta}$ by the channel estimate $\hat{c}_{cpich}(n)$ computed relying on the CPICH pilot symbols. The continuous provision of known pilot symbols over the CPICH channel can be easily exploited by the UE to track the variations due to the Doppler spread of the channel path coefficient $c(k)$ by continuously updating the CPICH channel estimate $\tilde{c}_{cpich}(k)$. The tracking of the DPDCH channel is inherently obtained as the product $\tilde{c}_{dpdch}(k) = \hat{\beta}_{ML}\tilde{c}_{cpich}(k)$. Finally we shall remark that within our second algorithm the DPCCH pilots are not directly used to compute a DPDCH channel estimate but only to compute an estimate of the factor β. If necessary and/or if the UE can afford the increased complexity hard decision taken, the DPDCH can be used as pilot symbols to improve the estimate of β as represented by the equations derived above.